PROCEEDINGS

OF

THE ROYAL SOCIETY.

November 17, 1881.

THE PRESIDENT in the Chair.

In pursuance of the Statutes, notice of the ensuing Anniversary Meeting was given from the Chair.

Mr. Alfred Bray Kempe was admitted into the Society.

Professor W. G. Adams, General Boileau, General Clerk, Dr. Duncan, and Mr. R. H. Scott, having been nominated by the President, were elected by ballot Auditors of the Treasurer's Accounts on the part of the Society.

The Presents received were laid on the table, and thanks ordered for them.

A letter from the Foreign Office was read inclosing a despatch, dated September 1, 1881, from Major Wodehouse, Her Majesty's Consul at Honolulu, stating that the flow of the lava-stream from the volcano, Mauna Loa, had "finally ceased."

The following Papers were read:—

I. "Preliminary Note on the Photographic Spectrum of Comet *b* 1881. By WILLIAM HUGGINS, D.C.L., LL.D., F.R.S. Received June 27, 1881.

[PLATE 1.]

On the evening of June 24, I directed the reflector furnished with the spectroscopic and photographic arrangements described in my paper "On the Photographic Spectra of Stars"* to the head of the comet, so that the nucleus should be upon one half of the slit. After one hour's exposure the open half of the slit was closed, the shutter

* "Phil. Trans.," 1880, p. 669.

withdrawn from the other half, and the instrument then directed to Arcturus for fifteen minutes.

After development, the plate presented a very distinct spectrum of the comet, together with the spectrum of the star, which I have already described in the paper referred to above.

The spectrum of the comet consists of a pair of bright lines in the ultra-violet region, and a continuous spectrum which can be traced from about F to some distance beyond H.

The bright lines, a little distance beyond H, with an approximate wave-length from 3870 to 3890, appear to belong to the spectrum of carbon (in some form, possibly in combination with hydrogen), which I observed in the spectra of the telescopic comets of 1866 and 1868.

In the continuous spectrum shown in the photograph, the dark lines of Fraunhofer can be seen.

This photographic evidence supports the results of my previous observations in the visible spectra of some telescopic comets. Part of the light from comets is reflected solar light, and another part is light of their own. The spectrum of this light shows the presence in the comet of carbon, possibly in combination with hydrogen.

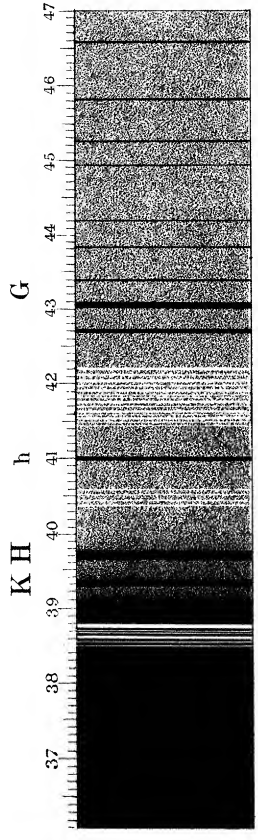
On the next night, June 25, a second photograph was obtained with an exposure of an hour and a half. This photograph, notwithstanding the longer exposure, is fainter, but shows distinctly the two bright lines and the continuous spectrum, which is too faint to allow the Fraunhofer lines to be seen.

(Postscript, July 9, 1881.)

I have since measured the photographs of the comet's spectrum, and I find for the two strong bright lines the wave-lengths 3883 and 3870. The less refrangible line is much stronger, and a faint luminosity can be traced from it to a little beyond the second line 3870. There can be, therefore, no doubt that these lines represent the brightest end of the ultra-violet group which appears under certain circumstances in the spectra of the compounds of carbon. Professors Liveing and Dewar have found for the strong line at the beginning of this group the wave-length 3882·7, and for the second line 3870·5.

I am also able to see upon the continuous solar spectrum, a distinct impression of the group of lines between G and *h*, which is usually associated with the group described above. My measures for the less refrangible end of this group give a wave-length of 4230, which agrees as well as can be expected with Professors Liveing and Dewar's measure 4220.

In their paper "On the Spectra of the Compounds of Carbon," "Proc. Roy. Soc.," vol. 30, p. 494, Professors Liveing and Dewar show that these two groups indicate the presence of cyanogen, and



Spottiswoode & Co. Lith. London.

are not to be seen in the absence of nitrogen. If this be the case, the photograph gives undoubted evidence of the presence of nitrogen in the comet, in addition to the carbon and hydrogen shown to be there by the bright groups in the visible part of the spectrum. On this hypothesis we must further suppose a high temperature in the comet unless the cyanogen is present ready formed.

I should state that Mr. Lockyer regards the two groups in the photograph, and the groups in the visible spectrum, to be due to the vapour of carbon at different heat-levels ("Proc. Roy. Soc." vol. 30, p. 461).

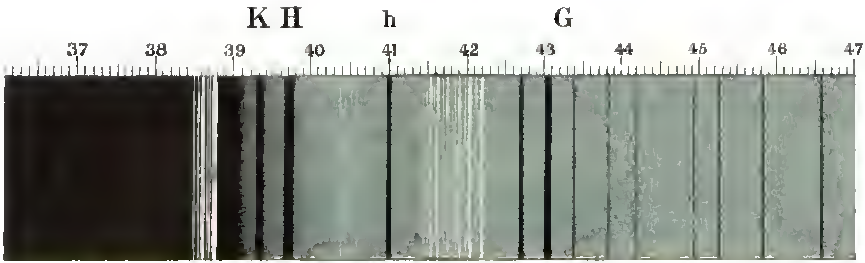
It is of importance to mention the strong intensity in the photograph of the lines 3883 and 3870, as compared with the continuous spectrum, and the faint bright group beginning at 4230. At this part of the spectrum, therefore, the light emitted by the cometary matter exceeded by many times the reflected solar light. I reserve for the present the theoretical suggestions which arise from the new information which the photographs have given us.

The diagram shows the two sets of bright lines and the solar spectrum. There is also indicated in it a small increase of brightness between *h* and H, which was suspected in the photograph.

[The accompanying lithograph was executed by order of the British Association for the Advancement of Science, for the illustration of the forthcoming Report for 1881. The use of the stone has been allowed to the Royal Society by the Council of the Association.—G. G. Stokes, Sec. R.S.]

II. "Note on the Reversal of the Spectrum of Cyanogen." By G. D. Liveing, M.A., F.R.S., Professor of Chemistry, and J. Dewar, M.A., F.R.S., Jacksonian Professor, University of Cambridge. Received July 4, 1881.

In the course of many observations on the reversal of lines of metallic spectra, we have frequently noticed dark shaded bands which appeared to be the reversals of bands ascribed to the oxides or chlorides of sundry metals; more particularly we have seen them when experimenting with compounds of the alkaline earths, and we have repeatedly obtained a reversal of the green magnesium-hydrogen series; but, until recently, we have never seen any reversal of the shaded bands of the spectrum of cyanogen, though our attention has been constantly directed to this spectrum. Quite lately, however, we have obtained photographs which show the reversal of the violet and ultra-violet bands of this spectrum; and the fact is perhaps of sufficient interest, especially in connexion with the question of the occur-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